knows the geometrical method used by these architects, will be able to find the corresponding mathematical formula. However, the ancient masters supplied the deficiency of the latter by drawing their plans and elevations on the largest possible scale, as is proved by the old plan and elevation of the first planned towers at Cologne, the "fac-simile" of which was published by Moller—by the yet existing old plans for the Minster at Strasburg—and for the tower of the Ulm-minster, the elevation of which we find in Kallenbach's "Chronologie"—by many ancient plans and elevations for the Cathedral at Vienna, which are quoted as yet existing in Tschischka's description of that church. In all these parchment drawings the scale is so large that we are able to ascertain the measures to the half, and even to the fourth part of an inch; and thus there can be hardly a mistake in the measurement, and we must remember that all those drawings are but general plans, and that for the details, most probably partial plans and elevations were made of the actual size.

In studying and comparing the churches of the middle ages, I became persuaded that out of a ground-line or sum, considered as basis, there can be developed, either by a geometrical or algebraical method, between thirty and sixty sums or lines, corresponding to the size, age, and importance of the building, and there is, with very few exceptions, not a structural member, be it large or small, the proportions of which are not defined by one of these lines or sums, or exceptionally by their multiplies or divisions. I say with a few exceptions, because there are parts which depend entirely, not upon architectural rules, but upon the size of the human frame: for instance, a staircase must be proportioned to the steps of a man, and they cannot depend upon the size of the structure: such an exception is also the width of the doors or windows, and in most cases the width or opening of the bays. I have to add, moreover, that, where a size defined in its integrity according to the principle has, as subdivisions, smaller or equally strictly defined sizes, one of these smaller sizes always compensates for the deficiency in the whole sum.

It is impossible for a single individual to trace the above-mentioned laws in every old building still remaining: I therefore confined my investigations to churches and temples, and did not even extend my research to wood construction or vaulting, so far as the latter exceeds the material of hewn stone. And with this restriction I was able to analyse the most renowned Gothic churches in England, Germany, and Hungary, as those of St. Albans, Gloucester, Durham, Salisbury, Canterbury, Worcester, York, Cologne, Friburg, Vienna, Meissen, Marburg, Oppenheim, Kaschau, and Buda. Besides, I traced back to the tenth century the first dawning of the knowledge of these laws in Germany, and analysed eighteen churches and six crypts remaining in the central part of that country; moreover, I investigated ten churches on the Rhine, all built in the Romanesque style, and six of the Transition period, as those of Limburg, Gelnhausen, St. Sebald, and Zsambek, the latter being a ruin in Hungary. Not content with the results obtained in that way, I tested also the ancient Greek temples, and found the same principle dominant even in the Parthenon, the temple of Euleithya and some others, only differently applied and less developed.

A sentence of Vitruvius, otherwise unintelligible, and the appearance of the same principle in the ruin of the old Doric temple at Corinth, lead me to suppose that we have to honour Pythagoras as the first discoverer of these laws of architectural harmony, which were brought from Byzantium to Germany, probably in the time of Emperor Otto the First, and thence propagated through France, England, and other European countries. But if we acknowledge Pythagoras, or even any other Greek, to have been the first inventor of the principle, the full development of it is due to the architects of the thirteenth and fourteenth centuries, and a Christian cathedral stands in every respect as high above the finest Greek temple, as Shakspeare's tragedies surpass those of Sophocles.

The Romans built their temples and basilicas on a different method, which was not organic, but arbitrary: this is proved as well by the theories of Vitruvius as by the greatest part of the remaining ruins: nevertheless, we also find Roman temples constructed on the Greek principle, but then we are obliged to take those buildings for works of Greek masters initiated in the earlier organic method.

As the earliest Christian churches in the Romanesque style were commonly fashioned after the Roman basilica, the principle is the same in both, but even this more arbitrary principle is far different from the entirely arbitrary way used in modern times; for in those buildings a certain part is always regarded as a *unity*, from which, as a fundamental dimension, the proportion of each distinct architectural member is developed.

I am not of opinion that even the best architects of bygone times attained to the highest possible degree of harmony, but surely their best works are not behind the best productions in musical art. This leads me to the firm persuasion that their principle was that of natural harmony, the more so because this principle is at the same time a mathematical and an organic one, since the works constructed on it have a very similar effect upon the mind as harmony in music, and because, as I believe, the same principle will be found dominant wherever different sizes unite to produce a common effect. I therefore think the knowledge of this principle a highly valuable one, not only for architectural but also for many other purposes. Notwithstanding this persuasion I will here dwell merely on its application to architecture, and even slightly touch upon the point that true Gothic buildings cannot be erected without the exact knowledge of the Gothic proportions; that the bare imitation of Gothic ornaments and outlines cannot give a genuine Gothic character to a building; and that a modern work is therefore easily distinguished by an experienced eye from an old one, and indeed not to the advantage of the former. I am further of opinion that, from a knowledge of the true organic proportions, much time, material, labour, and cost would be spared in planning and building, and that whenever a good restoration is required, this knowledge of the principle on which the first plan was raised is almost indispensable. So much for the immediate practical use of my discovery, and that I think, too, that harmony is of practical moment in human life.

It is true that by the bare knowlege of the ancient principle of construction every one cannot at once become a great architect, for no art can be applied to practice without special talent; but, on the other hand, I am sure that, as in music, whoever respects the laws of thorough bass will never produce a piece of composition absolutely bad: so in architecture, whoever makes his works conform to the exigencies of the ancient laws, will, at least, not produce anything contrary to harmony, and that our so rarely meeting with a building of the middle ages, particularly of a religious destination, altogether displeasing, is a proof of the above statements, to which I may nevertheless add, that the knowledge of the master-law was not common to all workmen, even in the middle ages, but was eagerly watched as a deep secret possessed only by the most eminent of them, who were honoured as chief masters: indeed, Professor Kugler tells us, in his history of art, that a bishop was murdered at Utrecht by a master mason, because the son of the latter had revealed to him the architectural master-secret.

I am not as jealous of my secret as the ancient masters were of theirs: on the contrary, I wish to publish it for common use; but as I cannot expect a commensurate reward for the trouble and toil of many years from any bookseller, and as I wish to be enabled to accomplish the work under my hands, and to continue my studies respecting natural harmony, I appeal to you, gentlemen, requesting you to give attention to this matter, and to inquire into the truth of my discovery by appointing a committee, to whom I will lay open the whole economy as well as the details of my work. And in case the committee should be convinced of the correctness and importance of the principle, I would request the society to acknowledge it by a public document. This, and no more, is my request.

Dr. Henszlmann proceeded to read some remarks on the development of the ground plans of Mediæval Sacred Architecture in Germany and Hungary, which had guided him in the selection of his examples, as well as in making his researches into the laws of stone construction, which regulated the architecture of the middle ages.

At the close of the paper, Professor Donaldson said Dr. Henszlmann had developed some principles in the construction of foreign churches which he (Professor Donaldson) was not before acquainted with, and which had not been alluded to in the very able work by the Master of Trinity. The first point to which Dr. Henszlmann had referred was the supposed existence of some hidden principle in Mediæval church architecture, which it had been the anxious desire of architects of all ages to discover; and he had duly adverted to the works of the numerous English and foreign writers who had devoted their attention to that subject. Various theories, as the meeting knew, had been propounded by these writers, and, in fact, architects had been so distracted by a series of different systems, that they were puzzled which to select as a basis on which to proceed in designing new edifices. The particular buildings referred to by Dr. Henszlmann were exceedingly interesting, especially from the great antiquity of some Gothic churches on the continent, compared with which those of England might be regarded as of recent date. At Ravenna there were buildings of the sixth century; and others at Constantinople of the same, and even earlier date. The adoption in other countries of the form of the Byzantine church—that of the Greek cross, with four equal arms, surmounted by five cupolas—was a point to which he had hoped Dr. Henszlmann would have alluded. Of this there was a curious example in France, in the church of St. Frond, at Perigueux, erected in the eleventh century, when it was supposed that the Greek forms were entirely superseded by the adoption of the Latin cross. The originality and imagination displayed in the churches of Germany were especially remarkable; and it would be marvellous if Dr. Henszlmann's theory should be applicable to all the varieties which they presented at different periods.

After some conversation,

The Chairman (Mr. Inman) thought it right to state that Dr. Henszlmann had not proposed to submit his discovery to the present meeting: his proposition was (and it was for the meeting, if they approved it, to authorise the Council to accept it) that the subject should be referred to a committee of a limited number of gentlemen, to whom he would freely communicate it; who should report upon it to the Institute. Dr. Henszlmann's remarks afforded a gratifying proof of the progress which had been made in the study of architectural principles in the last thirty or forty years. Some gentlemen present might recollect an article in the *Edinburgh Review*, in the year 1806, on a pamphlet by M. Dutens, in which the origin of the arch was conclusively traced to the Romans. Recent discoveries, however, had shown that there were round and even pointed arches in ancient Assyria. He fully concurred in the remark that the same principles were to be traced in Greek as in Gothic architecture: of this indeed there could be no doubt, for all proportion was based upon mathematical principles, regard having first been given to the centre of gravity, and then to equipoise, &c. Far different, however, was the doctrine with respect to the graces of harmony to be afterwards added to a building: this, for want of a better term, might be called embellishment, and it involved a consideration of the destination of the building. As a musical production which, to an untutored ear, would seem to be an entirely chance production, might nevertheless be based upon fixed principles of harmonic proportions, so in architecture there

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